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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,861	07/31/2003	Hiroshi Sera	116741	9071

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ALEXANDRIA, VA 22320

EXAMINER

SULLIVAN, CALEEN O

ART UNIT	PAPER NUMBER
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1756

MAIL DATE	DELIVERY MODE
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10/02/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/630,861

Applicant(s)

SERA ET AL.

Examiner

Caleen O. Sullivan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 8 is/are pending in the application.
- 4a) Of the above claim(s) 5-7 and 9-11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Response to Amendment

1. Applicant's amendment to claim 1 and the arguments presented have failed to overcome the rejection of claims 1-2 and 8 under 35 USC 102(e) over Okamoto ('007). Applicant's amendment to claim 1 and the arguments presented have also failed to overcome the rejection of claim 3 under 35 USC 103(a) over Okamoto ('007) in view of Reichmanis ('018) as well as the rejection of claims 4 and 8 under 35 USC 103(a) over Okamoto ('007) in view of Xu ('149). Therefore, Examiner restates the grounds of rejection presented in the previous Office Action in response to the amendments.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-2 and 8 are rejected under 35 U.S.C. 102(e) as being anticipated by Okamoto ('007). Okamoto ('007) discloses a method of forming an image in a photosensitive layer. The process consists of first subjecting the photosensitive layer to a scanning exposure with a laser light having a wavelength from 650 to 1300nm, developing the image and then subjecting the entire surface to post development exposure. (See, col.15, 12-17). This disclosure meets the limitations of claims 1 where a photosensitive resin layer is formed on a substrate, a first exposure step is performed for the photosensitive resin layer and the resin layer subjected to exposure is developed. Moreover, this meets the limitation of claim 1 where a second exposure of the developed resin layer is performed.

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Okamoto also discloses that the photosensitive layer is a photopolymerizable compound that includes an ethylenically unsaturated compound (See, col.2, 46-54), which Okamoto ('007) discloses can be (meth)acrylates of a (meth)acrylic acid. (See, col.3, 18-19). This disclosure meets the limitation of claim 2.

Okamoto ('007) then discloses that the second or whole image exposure step is performed with an exposure energy that is between 15-70 times greater than the first exposure step. (See, col.15, 60-col.16, 7). Okamoto ('007) also discloses that it is preferable to carry out the whole image exposure step at with exposure energy in a range from 10 mJ/cm² to 10 J/cm², more preferably from 20 mJ/cm² to 9 J/cm² and even more preferable from about 50 mJ/cm² to 8 J/cm². (See, col.16, 9-17). This disclosure encompasses the limitation of claim 1 where the second exposure step is performed with irradiation energy of greater than 10 J/cm² to less than or equal to 30 J/cm².

Okamoto ('007) goes on to disclose that a light source for the whole image exposure step includes a high-pressure mercury lamp and a light having a wavelength of 200nm to 1100nm. (See, col.16, 18-28). This disclosure meets the limitations of claim 3 where the second exposure step is performed with a high-pressure mercury lamp and encompasses the range recited in claim 3 for the wavelength of the light used for the exposure. Okamoto ('007) then discloses that for the whole image exposure it is preferable to provide a light with intensity in the range from 10mW/cm² to 1W/cm², preferably from 15mW/cm² to 700mW/cm² and more preferably from 25mW/cm² to 500mW/cm². (See, col.16, 29-36). This disclosure encompasses the limitation of claim 3 where the illuminance is 80 mW/cm² or more.

Okamoto ('007) further discloses that at the time of the whole image exposure it is preferable to raise the temperature of the image forming surface of to a temperature from 20°C-300°C, preferably 23°C-250°C more preferably from 40°C-200°C by heating the substrate with a hot

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plate or by the heat from the radiation light source. (See, col.16, 44-53). This disclosure encompasses the limitation of claim 1 where the second exposure step is performed at a temperature of 100°C-250°C.

Although Okamoto ('007) does not explicitly disclose that the high-pressure mercury lamp has a luminescence peak at 365nm, it is inherent that it would have this peak because the high-pressure mercury lamp disclosed in Okamoto ('007) functions at the illuminance recited in claim 3 and at the wavelength recited in claim 3. Moreover, although Okamoto does not explicitly disclose image-forming method is for forming an electro-optical device, Examiner has interpreted such language in the claims as describing the intended outcome or use of the process recited in claim 1. Therefore, the disclosures of Okamoto ('007) also meet the limitation of claim 8.

Okamoto ('007) teaches all the limitations of claims 1-3 and 8.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okamoto ('007) in view of Reichmanis ('018). Okamoto ('007) is relied upon as discussed in the rejection of claims 1-3, and 8 under 35 USC 102(e) in paragraph 3 above. Still Okamoto ('007) fails to explicitly disclose the limitation of claim 3 where the high-pressure mercury lamp has a luminescence peak at a wavelength of 365nm. However, Reichmanis ('018) discloses such a process step.

Reichmanis ('018) discloses a high-resolution multiple exposure microlithography patterning process. In this process Reichmanis ('018) discloses that an organic resin layer is on a surface to be patterned and over which an inorganic resist layer overlies. (See, abstract). A pattern is produced in the inorganic layer by radiation and after development the pattern is replicated in the organic layer by addition exposure to radiation. (See, abstract). In Example 1, Reichmanis ('018) discloses that the copying of the pattern developed in the inorganic layer is transferred to the organic layer in the second exposure step by flood exposure using a 200W high-pressure mercury lamp that produces radiation having a typical exposure spectrum with energy peaks at wavelengths of 365nm, 405nm and 436nm. (See, col.4, 51-55). This disclosure meets the limitation of claim 3 where the high-pressure mercury lamp has luminescence peak at wavelength of 365nm.

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the teachings of Okamoto ('007) with the teachings of Reichmanis ('018) because Reichmanis ('018) teaches that one can perform a secondary flood exposure step in a patterning process using a high-pressure mercury lamp with energy peaks at 365nm, 405nm and 436nm to form a high resolution pattern of a device surface.

7. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okamoto ('007) in view of Xu ('149). Okamoto ('007) is relied upon as discussed in the rejection of claims 1-3 and 8 under 35 USC 102(e) in paragraph 3 above. Still Okamoto ('007) fails to disclose the limitation

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of claim 4 where the second exposure step is performed using a filter that removes rays of a wavelength less than 300nm from the rays emitted from the high-pressure mercury lamp. Moreover, Okamoto ('007) fails to disclose the limitation of claim 8 where an electro-optical device is manufactured using the steps for forming an insulating resin layer recited in claim 1. However, Xu ('149) discloses such limitations.

Xu ('149) discloses a process to provide an optical device, as recited in claim 8, which includes a substrate and a patterned light transmissive core composition on the surface of the substrate along with a light reflecting cladding composition on the pattern of the core. (See, abstract). Xu ('149) discloses that the patterning process can use a multi-photon process initiated by a high intensity source of radiation. (See, col.8, 55-62). Xu ('149) then discloses that sources of the radiation include high-pressure xenon or mercury-xenon arc lamps that are fitted with an appropriate optical filter to select the desired wavelengths for the processing. (See, col.8, 55-62). This disclosure meets the limitation of claim 4. Xu ('149) also discloses that the core layer comprises a photopolymerizable monomer, oligomer or monomer component with at least one ethylenically unsaturated group with preferred polymeric components including esters and partial esters of acrylic acid. (See, col.2, 63- col.3, 2; col.4, 52-55).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the teachings of Okamoto ('007) with the teachings of Xu ('149) because Xu ('149) teaches that one can form an optical device with a patterned light transmissive layer on the surface of the substrate using a high pressure mercury lamp that includes a filter to select the desired wavelength for processing, along with polymeric materials that have low optical loss good long term and short term stability that is flexible and reduces stress or crack induced optimal scattering loss.

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Response to Arguments

8. Applicant's arguments filed 09/07/07 have been fully considered but they are not persuasive.

Applicant argues that Okamoto ('007) fails to particularly disclose the second exposure step of claim 1 where the exposure is performed on the developed photosensitive resin layer at a substrate temperature of 100°C-250°C with an illuminance of 80mW/cm² or more and a radiation energy of greater than 10 J/cm² to less than or equal to 30 J/cm². However, Examiner is of the position that the energy ranges disclosed in Okamoto ('007) for the second exposure step (See, col.16, 9-17) encompass the range recited by applicant in amended claim 1; therefore, Okamoto ('007) teaches, suggests or discloses all the limitations of claims 1-3 and 8. Therefore, Examiner maintains the position that the rejection of claims 1-3 and 8 over Okamoto ('007) is proper; the rejection of claim 3 over Okamoto ('007) in view of Reichmanis ('018) is proper; and the rejection of claims 4 and 8 over Okamoto ('007) in view of Xu ('149) is proper.

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caleen O. Sullivan whose telephone number is 571-272-6569. The examiner can normally be reached Monday-Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/COS/, 09/17/07.

A handwritten signature in black ink, appearing to read 'Mark F. Huff', is written over a horizontal line.

MARK F. HUFF
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700